



# ENGINEERING MAINTENANCE BRANCH BULLETIN

Issue # 013

## THIS ISSUE CONTAINS:

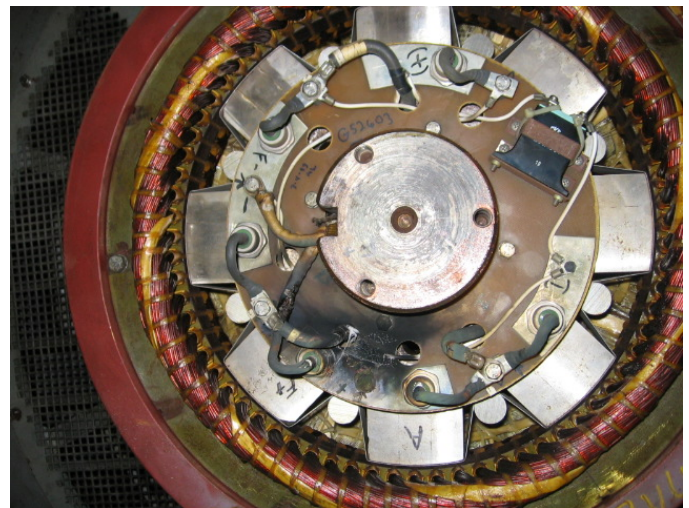
- *Picture of the Month*
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This is *the* engineering maintenance management bulletin to MSC ships and shoreside personnel. The purpose of the bulletin is to inform all concerned of current COMSC Preventive Maintenance management practices associated with any new or revised policy and procedures, along with helpful tips & tricks for improved maintenance. The bulletin will also discuss and present any upcoming initiatives in the various programs.

We continue our efforts to bring you useful information with the page dedicated to the Vibration Monitoring System (VMS). This will have useful tips as well as past case histories.

## PICTURE OF THE MONTH REQUEST - ***WE NEED YOUR PICTURES!!***

It is said, “A picture’s worth a thousand words!” If you have pictures of Shipboard Maintenance (Vibration Monitoring, Oil Sampling, machinery upkeep, etc.) being performed, or a visit from a SAMM or VMS Tech Rep, please send them (along with a *brief* narrative as to what the picture is about) to Norman Wolf (e-mail: [Norman.wolf@navy.mil](mailto:Norman.wolf@navy.mil)).



Aboard the USNS Bowditch (T-AGS 62), shorted wires on the No. 4 SSDG rectifier are shown here (blackened, lower section). This was discovered after a problem was first determined (there was a slight increase in vibration) on the generator drive end, then through the annual Thermographic inspection.

## SAMM/Maintenance Tips

**Oil Analysis Tip:** Before taking a large number of oil samples using pre-labeled bottles, mark the bottle caps with enough information to enable quick recognition of which bottle you need to pull out for sample points. This procedure enables you to go directly to the correct sample bottle without having to search through the entire box looking at labels to find the right one. This saves a lot of time and helps eliminate using the wrong bottle.

-Tip provided by Bob Gelow, Equipment Condition Specialist, Colorado Springs Utilities, Colorado Springs, CO

**Alignment Tip:** I have seen during many walkdowns where too many shims have been utilized to make vertical corrections, sometimes as many as 10. When this many shims are used a condition referred to as spring or squishy foot occurs.

Rule of thumb is no more than four (4) shims to be used under any foot. Replace multiple thin shims with single-thickness plates. Imperfections in the shims (too many) can cause the spring or squishy foot at the rate of approximately three mils per shim.

-Tip provided by Carol Pettit, PdM Engineer, TVA, Madison, Alabama



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## Planned Maintenance Optimization – An Update

(by Andrew Shaw and Randel Torfin, MSC)

### Background

In the July 2005 Engineering Maintenance Bulletin, the Planned Maintenance Optimization (PMO) initiative was introduced. It talked about what PM Optimization is, what it will do, why it was started, and the basic methodology to be used. One of the driving factors for PM Optimization was an emergency Civilian Leadership Council (CLC) held Oct 2004 because of the high visibility of equipment failures on several MSC ships. Representatives from each Program Manager attended and the meeting was led by MSC's Chief of Staff. One result from the meeting was that the Shipboard Automated Maintenance Management (SAMM) planned maintenance actions were to be reassessed. Based on this decision, MSC Engineering (N7) was directed to take action. N7 developed the PM Optimization process plan to assess each machine in the SAMM system based on a critical risk assessment and apply planned maintenance accordingly.

Through PM Optimization, N7 is reviewing all maintenance in the SAMM system. N7 wants to optimize the Preventive and Condition Based Maintenance actions that will be performed by ships' work force. In order to achieve this result, PM Optimization is reviewing OEM technical manuals for recommended maintenance actions and comparing them to the SAMM maintenance actions, reviewing previously submitted feedback, and presenting the recommendation to a cross functional representation of ship's maintenance personnel including Chief Engineers, Port Engineers, and Program Manager project engineers. PM Optimization reports are created to show current SAMM maintenance actions and recommended changes. However, for PM Optimization to be successful, it is essential that ship's force (SF) and Program Management (PM) be *proactively* involved in reviewing and providing feedback to N7. The goal of PM Optimization is to ensure that SAMM maintenance is optimized in order to "prevent or detect impending casualties" while eliminating unnecessary maintenance.

The PM Optimization process reviews what we call critical and generic maintenance plans for each ship class. Critical maintenance plans are an in depth analysis of critical machinery (based on a Critical Risk Factor Assessment, see July 2005 Bulletin) and the optimal maintenance to be performed. A Critical PM Optimization report is created from OEM technical manual recommended maintenance, current SAMM maintenance, MSC's maintenance methodology, and all feedbacks. The reports provide our recommendations to the Program Manager and Ship's Force maintenance personnel. After review, possible modification, and final approval, the planned maintenance plan from each report is registered in SAMM as approved maintenance plan to that critical machinery and applied into the SAMM system.

PM Optimization reports for "generic" machinery (pumps, fans, motors, motor controllers, etc.) are created in a similar methodology, but the reports contain all the machinery of a particular type, i.e. pumps, rather than a specific make and model machine in the critical machinery reports. The reports are presented in a spreadsheet format, which displays current maintenance actions in SAMM compared to the recommended maintenance actions on a per machine basis. The generic equipment term derived its name because most pumps, fans, motors, motor controllers, and batteries have very similar maintenance fleet wide. Whereas critical equipment such as main propulsion engine has maintenance that is typically ship specific.

The PM Optimization is essentially based on the Critical Risk Factor (CRF) assessment applied to SAMM equipment (see the July 2005 bulletin for details). The CRF is used to determine the level of maintenance assigned to each piece of equipment. The CRF is calculated from the sum of five factors assessed for each equipment; mission and financial impact factor; operation factor; redundancy factor; safety and environmental impact factor; and environment factor.

### **CRF Guidelines:**

Based on the assigned CRFs, equipment are evaluated to 4 levels:

**L1** = Minimal preventive maintenance applied. Life extension maintenance actions assigned, if any. No data collected or trended. Repair as necessary.



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**L2** = Planned inspection and replenishment actions. No data collected or trended.

**L3** = Planned replenishment action. Planned data collection. Planned non-intrusive checks. No planned inspection actions. Repair actions based on data analysis and trending. Additional replenishment actions based on data analysis and trending.

**L4** = Planned repair, replenishment and data collection actions. Additional repair and replenishment actions based on data analysis and trending. Component monitoring based on single analysis.

## **Current PM Optimization Status:**

The T-AO 187 class was completed and implemented into the SAMM database. Maintenance actions were approximately 1200 to 1300 a month before PM Optimization and now they are approximately 800 to 900. Approximately 20% of the maintenance was reduced.

The T-AKR 310 class CRF analysis is complete. The majority of the Critical Machinery plans have been developed and reviewed by Program Management. The Generic Machinery Maintenance plans have been developed and the approved maintenance changes have been applied to the class.

The T-ATF 168 class CRF analysis is complete and the Critical Machinery and Generic Machinery Maintenance plans have been developed and are being reviewed.

The T-AOE 6 class CRF analysis is complete and the Critical Machinery and Generic Machinery Maintenance plans are being developed to submit for review.

The T-AH 19 class CRF analysis is complete. The majority of the Critical Machinery plans have been developed and reviewed by Program Management. The Generic Machinery Maintenance plans have been developed and the approved maintenance changes have been applied to the class.

The T-AFS 3 & 8 class CRF analysis is complete and the Critical Machinery and Generic Machinery Maintenance plans are being developed to submit for review.

The T-AOE 6 class CRF analysis is complete and the Critical Machinery and Generic Machinery Maintenance plans are being developed to submit for review.

The CRF analysis for the T-AE 32, T-AGOS, T-AGS, T-AG 195, T-AGM, T-ARC T-AKR 287 and T-AK classes is complete. The Critical Machinery and Generic Machinery Maintenance plans have not been developed.

## **Challenges**

The greatest challenge for N7 in the PM Optimization process has been the involvement of Ship's Force and Program Management maintenance personnel. It is critical that N7 has participation from the Ship's Force and Program Management to achieve the success desired. We understand that it is another project to add to the plate, but the results can dramatically reduce unnecessary maintenance aboard ship.

N7 will keep an open door of communication with Ship's Force and Program Manager Personnel. We feel that greater visibility of our work will encourage more participation and involvement from ship and shoreside personnel, and maintain accountability and integrity of the SAMM system for all involved. Engineering's main goal is to have an optimization maintenance plan in SAMM that when performed by the Ship's Force will adequately detect and prevent impending machinery failures.

Feedback and cooperation in this PMO process is essential, and vital for SAMM's integrity and continued success. For further information, please contact Andrew Shaw (202-685-5721, [Andrew.shaw@navy.mil](mailto:Andrew.shaw@navy.mil)) or Randel Torfin (202-685-5744, [randel.torfin@navy.mil](mailto:randel.torfin@navy.mil)).

## **Engineering Maintenance Branch Website – Fresh and Updated!!**

The Engineering Maintenance Branch web page continues to get a bit of a facelift; along with some helpful downloads (SAMM, PENG, EASy overviews, OAS Guide, *past issues of our bulletin*, etc.), the latest CMEC Class information and who to contact for questions or comments regarding Engineering. Maintenance. For helpful updates, keep checking it out!

<http://www.msc.navy.mil/n7/engmgmt/engmgmt.htm>





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## Question of the Month: **What is Replication anyway?**

(By James Diaz, President,  
Emprise Corp.)

Replication is the term used to reference the process of sending and receiving SAMM data to and from the consolidated SAMM database. Since the introduction of SAMM 5.0 all of the vessels SAMM data is stored in a single shoreside "Consolidated SAMM Database". Changes that are made to the consolidated database are reflected in the vessels database via the replication process. Likewise changes made to the vessels SAMM database are reflected in the Consolidated via the replication process.

This architecture (single consolidated database) provides the MSC with significant advantages, for example:

- 1) Data can now be analyzed across vessels and a class of vessels;
- 2) Parameters associated with data collection or maintenance procedures, can be changed and these changes are

automatically disseminated across the fleet;

- 3) There is a far greater consistency of parameters because of database design and the ability to compare across vessels.
- 4) For the majority of MSC vessels this replication is invisible to shipboard personnel, therefore reducing the effort associated with the old method of sending and receiving SAMM databases on disk.

This technology requires the transfer of "Replication Messages" to and from the consolidated and remote databases. A weekly "Replication Status Report" is sent to MSC and Seaworthy Systems and attempts to provide a snapshot of the "Status" of replication at a given point in time (see screen shot below). This allows MSC to determine whether a ship's replication is working properly, if a visit to a ship is required, or troubleshooting the system will be required.

For additional information or any questions, please contact Jim Diaz at Emprise (Ph: 860-464-8555, e-mail: james.diaz@emprisecorporation.com).

SAMM Replication Status

05/12/2006

Operator	PM	Remote User	Status Date	Status	Last Receive	Currency	Current Replication Method	Normal Replication Method	Problem	Action Required	Help Call	Help Call Date
MSC	PM2	USNS Loyal	02/13/2006	Problem	01/13/2006 17:38	Problem	File Based	File Based	Vessel is having trouble applying replication messages.	Visit required	105620	05/18/2006
Horizon	PM2	USNS Henson	02/13/2006	Problem	01/13/2006 17:44	Watch List	File Based	Dial-Up Automatic	Vessel is having trouble applying replication messages.	Visit required	104540	03/21/2006
Maersk 2	PM2	USNS Effective	05/03/2006	Problem	04/03/2006 20:38	Current	File Based	Dial-Up Automatic	Received vessel Mail Server configuration file on 5/15. The file shows the mail server is unregistered which is most likely caused by a configuration change. Contacting 501 to get an old copy of the configuration file to send to the vessel.	Visit may be required.	107115	04/25/2006
Horizon	PM2	USNS Bowditch	04/17/2006	Problem	03/17/2006 19:09	Current	File Based	Dial-Up Automatic	Vessel is having trouble applying replication messages.	Visit required	105656	06/06/2006
MSC	PM1	USNS Concord	03/27/2006	Problem	03/27/2006 11:05	Problem	Direct Connection	Direct Connection	Vessel is still catching up from loss of VPN connectivity.	Working via VPN to resolve.	105676	06/06/2006
MSC	PM2	USNS Muse Power Barge	05/08/2006	Problem	04/07/2006 15:13	Current	File Based	File Based	Vessel has not sent messages since 4/7	Contact vessel and request they send replication files.	??????	06/12/2006
MSC	PM2	USNS Coronado	05/03/2006	Problem	04/03/2006 20:59	Current	File Based	Direct Connection	Vessel is still catching up from loss of VPN connectivity.	Working via VPN to resolve.	105677	06/06/2006
MSC	PM1	USNS Tippecanoe	05/17/2006	Problem	05/16/2006 23:38	Current	Direct Connection	Direct Connection	Vessel is still catching up from loss of VPN connectivity.	Working via VPN to resolve.	105681	06/06/2006
Maersk 3	PM5	USNS Denebola	05/19/2006	Problem	05/18/2006 14:18	Current	Dial Up Automatic	Dial-Up Automatic	Vessel is not sending or receiving messages	Visit required	105688	06/06/2006
MSC	PM1	USNS Niagara Falls	06/01/2006	Problem	05/31/2006 13:47	Current	Direct Connection	Direct Connection	Vessel is still catching up from loss of VPN connectivity.	Working via VPN to resolve.	105683	06/06/2006
MSC	PM1	USNS Yukon	06/05/2006	Problem	06/02/2006 12:37	Current	Direct Connection	Direct Connection	Vessel is still catching up from loss of VPN connectivity.	Working via VPN to resolve.	105684	06/06/2006
Maersk 3	PM5	USNS Capella	06/07/2006	Problem	06/05/2006 13:40	Current	Dial Up Automatic	Dial-Up Automatic	Vessel has not connected since 6/4.	Contact vessel and verify modem connectivity.	??????	06/12/2006
Horizon	PM2	USNS Mary Sears	05/31/2006	Watch List	04/29/2006 21:41	Problem	File Based	Dial-Up Automatic	Vessel applied our files on 5/26 this should correct the currency problem. On 6/7 vessel reports files applied and caused large resend waiting until in port to send.	None.	105685	06/06/2006
Horizon	PM2	USNS John McDonnell	05/19/2006	Watch List	04/21/2006 17:08	Current	File Based	Dial-Up Automatic				
Amsea	PM5	USNS Shiloh	03/26/2006	Watch List	04/27/2006 15:54	Current	File Based	Dial-Up Automatic				
Maersk 3	PM5	USNS Regulus	06/05/2006	Watch List	05/03/2006 19:08	Current	File Based	File Based				
Maersk 2	PM2	USNS Impeccable	06/12/2006	Current	05/31/2006 12:57	Current	File Based	Dial-Up Automatic				
Maersk 2	PM2	USNS Victorious	06/12/2006	Current	06/05/2006 13:17	Current	File Based	Dial-Up Automatic				
Amsea	PM5	USNS Seely	06/12/2006	Current	05/31/2006 12:56	Current	File Based	Dial-Up Automatic				
Amsea	PM5	USNS Mentoncha	06/12/2006	Current	05/20/2006 11:36	Current	File Based	Dial-Up Automatic				
MSC	PM2	USNS Mount Whitney	06/12/2006	Current	05/12/2006 19:30	Current	File Based	File Based				



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## **N711 – Points of Contact:**

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Norm Wolf, (202) 685-5778  
([norman.wolf@navy.mil](mailto:norman.wolf@navy.mil));

Mechanical Engineers – Liem Nguyen, (202) 685-5969 ([liem.nguyen@navy.mil](mailto:liem.nguyen@navy.mil)) & Andrew Shaw, (202) 685-5721  
([andrew.shaw@navy.mil](mailto:andrew.shaw@navy.mil));

Electrical Engineer – David Greer (202) 685-5738 ([David.Greer1@navy.mil](mailto:David.Greer1@navy.mil))

## **CMEO Training – What Are YOU Waiting For????**

**CMEO (CIVILIAN MARINE ENGINEERING OFFICER)** is a two-week training course (held *quarterly*) at the Naval Supply Corps School in Athens, GA. It is for both shipboard and shoreside engineers. The Engineering Directorate (Code N7) of Military Sealift Command hosts the course and encourages **ALL** MSC Engineers (3<sup>rd</sup> A/Es through Chief Engineers, as well as Port Engineers and Project Engineers) to attend (*Note: MSC shipboard engineers are given priority when classes are full*).

CMEO provides training on an array of topics such as: SAMM (Condition Monitoring, Maintenance Scheduling and Repair, Diesel Engine Analysis, Logbook, etc.), Vibration Monitoring, Lube Oil, Fuel Oil (NEURS), Chemicals (boiler treatment, sewage treatment, etc.), Supply (COSAL, ShipCLIP), Environmental, and Safety. SAMM is interactively taught using actual data and each module is discussed extensively.

Upcoming CY '06 class dates:

- July 10-21, 2006 ← **Filled up!**
- December 04-15, 2006 ← **Apply for NOW!**

For further information and to sign up, please go to the CMEO website:

<http://63.219.124.12/cmeoclasssignup/cmeo.htm>

Or contact Dave Greer ([david.greer1@navy.mil](mailto:david.greer1@navy.mil)) with any questions.



## **FEEDBACK – AN ENLIGHTENING RIDE**

“...enjoyed the bulletin.” – ChEng, USNS MARTIN

“...thanks for the information. I will pass it on to the crew.” – ChEng, USNS PILILAAU

“The bulletin is posted on [the server]... on a monthly basis... everyone has access to it.” – ChEng, USNS RED CLOUD

With each issue, we get more and more requests for the newsletters, from both shoreside AND shipboard engineers, so we know you're reading them. **Take the time and tell us what YOU think and what YOU want to see on these pages!** Feedback is essential in making this bulletin a help to do your job “smarter not harder” for all shipboard personnel. Please pass on **any and all** feedback from your Engine Department personnel. We'll post more feedback in future issues in a new column.

Make this **YOUR** Maintenance Management Bulletin. If there's a SAMM or Maintenance tip, topic, question, suggestion, or comment on how to make this useful, or something relating to Engineering Maintenance you think should get out to the ships, please pass it on. Send your submission to Randy Torfin ([randel.torfin@navy.mil](mailto:randel.torfin@navy.mil)) OR Norman Wolf ([norman.wolf@navy.mil](mailto:norman.wolf@navy.mil)).

## **COMING UP FOR NEXT ISSUE!**

**More SAMM/Maintenance Tips!!**

**Electrical Maintenance Technology**

**Another ‘Question of the Month!’**

**A New Picture of the Month!**

**Vibration Monitoring Tips & Information**

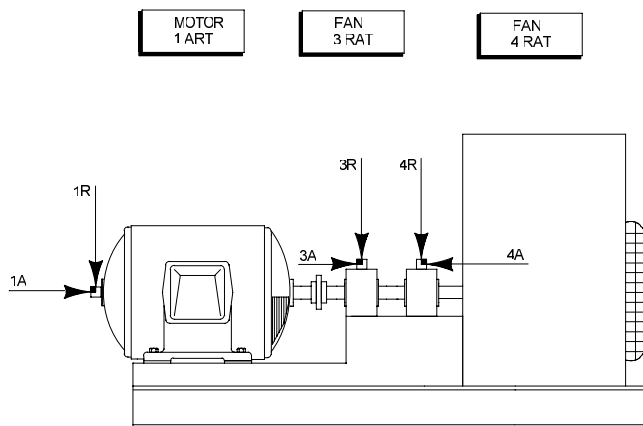


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## VMS CASE HISTORY - FORCED DRAFT BLOWER

(By Mike Johnson, DLI Engineering)

Upon downloading the raw vibration data to the onboard SAMM workstation, the Expert Automated Diagnostic System (EADS) compares measured data to a fleet average to determine if any problems exist. On May 8, 2006 the USNS OBSERVATION ISLAND collected vibration data on its two Forced Draft Blowers and EADS diagnosed Serious Fan Free End Bearing Wear.



**Figure 1.** Force Draft Blower sketch showing test locations.

This fan is directly coupled to a 150 HP motor and supported by two bearings labeled “fan coupled end” and “fan free end”. Here is what the automated report received by the Chief Engineer.

### NO. 2 FORCED DRAFT FAN

Date of Analysis: 2006-05-8 12:26:22

Machine Speed 1XM = 1200.15 RPM

Spec. Averages: 18

Maximum Peak: 111 VdB (+16) [4T] at 5.83 X M

Recommendation:

**IMPORTANT: REPLACE FAN FREE END BEARING**

Fault:

**SERIOUS FAN FREE END BEARING WEAR  
INDICATED BY:**

101 VdB (+ 9) [4A] at 5.83 X M

94 VdB (+ 9) [4A] at 6.67 X M

102 VdB (+17) [4R] at 5.83 X M

96 VdB (+17) [4R] at 6.67 X M

91 VdB (+ 8) [4R] at 6.67 X M

111 VdB (+16) [4T] at 5.83 X M

After the data and automated report were replicated ashore, DLI Engineering provided the following manual review comments.

Upon manual review the expert systems diagnosis of serious fan bearing wear is confirmed and upgraded in severity to **extreme**. The harmonic pattern in the data from the fan bearing (nearest the fan) was not seen in the test on 4/30/2006 (2 weeks ago), and could indicate a problem. There appears to be another component rotating at about 1000 CPM that is creating a significant amount of energy. This is not likely to be external excitation as it is much stronger on the fan bearing nearest the fan rotor when compared to the fan bearing near the coupling. Is it possible that the test was done with the fan in a coast down mode? It is advised to do a through tactile, audible, and visual inspection on the coupling, fan bearings, and fan rotating assembly. If nothing abnormal is seen in these inspections it would be prudent to retest the unit at a speed of 1200 rpm with a steady boiler load.

The Chief Engineer responded to DLI Engineering with the following comments:

*“The bearing is definitely bad. Making lots of audible noise and getting hot. We ordered a new one which should be here sometime next week. Thanks for your email and support – it’s nice to have that kind of help from you guys.”*

Figures 2 and 3 on the next page show the vibration spectra before and after the bearing replacement.

DLI’s Engineers will work with you on determining potential machinery vibration problems. For questions, verification, or assistance on any EADS diagnosis, please contact Mike Johnson ([mjohnson@dliengineering.com](mailto:mjohnson@dliengineering.com)) or Brian Hoyson ([bhoyson@dliengineering.com](mailto:bhoyson@dliengineering.com)).



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Plant: USNS Observation Island AREA: STEAM  
MACHINE: NO.2 FORCED DRAFT FAN LOCATION: FAN Free End [4]MID: 1053  
1000.5 CPM, 0.83X, 78.3 VdB, 5/8/06 12:16 Tangential

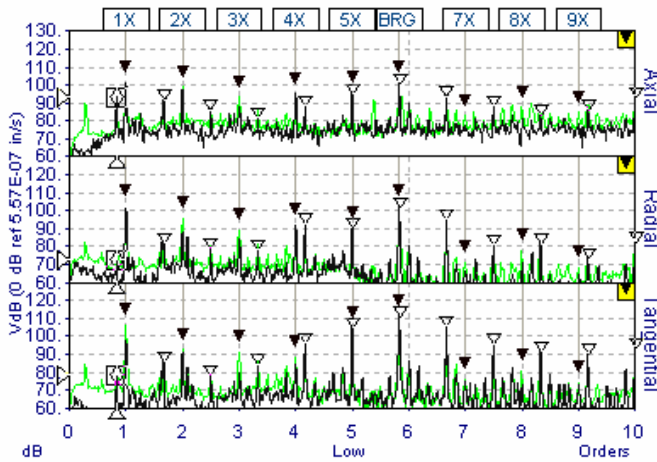


Figure 2. Pre – repair vibration spectra.

Plant: USNS Observation Island AREA: STEAM  
MACHINE: NO.2 FORCED DRAFT FAN LOCATION: FAN Free End [4]MID: 1053  
1201.1 CPM, 1.00X, 93.9 VdB, 5/17/06 15:58 Axial

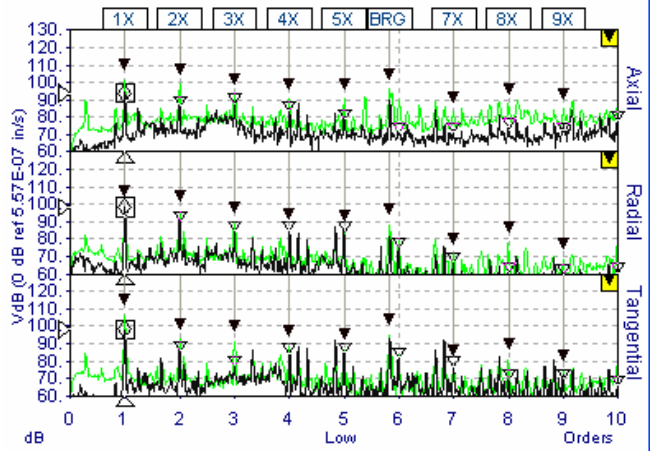


Figure 3. Post – repair vibration spectra.